

Abstract of the Disclosure

- 5 Genes and methods for optimizing levels of substrates employed in the biosynthesis of copolymers of 3-hydroxybutyrate (3HB) and 3-hydroxyvalerate (3HV) in plants and bacteria via manipulation of normal metabolic pathways using recombinant DNA techniques are provided. This is achieved through the use of a variety of wild-type and/or deregulated enzymes involved in the
- 10 biosynthesis of aspartate family amino acids, and wild-type or deregulated forms of enzymes, such as threonine deaminase, involved in the conversion of threonine to P(3HB-co-3HV) copolymer endproduct. By these methods, enhanced levels of threonine, α -ketobutyrate, propionate, propionyl-CoA, β -ketovaleryl-CoA, and β -hydroxyvaleryl-CoA are produced. Also provided are
- 15 methods for the biological production of P(3HB-co-3HV) copolymers in plants and bacteria utilizing propionyl-CoA produced through a variety of engineered metabolic pathways. Introduction into plants and bacteria of an appropriate β -ketothiolase, β -ketoacyl-CoA reductase, and PHA synthase, alone or in combination with various enzymes involved in aspartate family amino acid
- 20 biosynthesis and the conversion of threonine to PHA copolymer precursors, will permit these organisms to produce P(3HB-co-3HV) copolymers.